

Marine and Coastal Science for Teachers
Summer 1 2016
FACE-TO-FACE/ONLINE – Bellsouth Building Suite 201

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OFFICE HOURS: By appointment – Please feel free to come by with questions or concerns as well – BELL 201

SUMMARY: This course is geared to help you become an ocean science literate citizen – to understand the interrelationships between marine processes and your daily life and how you can make sound decisions regarding this. The ocean is a defining feature on Earth...it is the source of most life, regulates weather and climate, provides most of our oxygen, and feeds much of the human population. Yet this essential resource is being threatened by pollution, habitat degradation, overfishing, climate change and ocean acidification. The solutions to the current environmental challenges will come from human creativity, as individuals or businesses. It will take a deep and subtle understanding of our oceans for future generations to be able to provide a meaningful existence for all humans. This course will provide you a background for this understanding so that you can educate your students on making informed decisions about these issues or creative solutions to these challenges in the future. The course is designed (1) To introduce educators to ocean science concepts and how these may be used to address state standards; and (2) To introduce a variety of teaching strategies and tools that engage K-12 students in STEM, inquiry, problem-based and stewardship approaches.

LEARNING OUTCOMES

1. Develop a basic understanding of the essential principle of ocean science;
2. Recognize linkages between the ocean and Earth other systems; and
3. Develop an insight for the anthropogenic influences on the ocean environment.

READINGS: The course will be based upon the **Ocean Literacy Principles**, which are initiatives that provide guidance on what all Americans need to know about our planet and how it works; and **Of Sand and Sea: Teachings from the Southeastern Shoreline**, a book about our Ocean Planet. Both of these will be provided digitally along with any other pertinent readings on the course OAKS page.

STUDENT RESPONSIBILITIES: Although this class is primarily online, participation is **mandatory**. Your responsibilities are to communicate problems or issues in a timely and appropriate manner, be flexible, take an active role in your own learning, constructively participate in class discussions, maintain a reflection-, ask adventurous questions and provide solutions, complete reading assignments, submit weekly homework, journals, and various assignments on time.

GRADING: Grades will be determined on a point-based system:

Task	Percent	Examples Include:
Participation	10	Discussion, Problem Solving, Etc.
Homework	25	Reflections, Webquests, Lessons, Etc.
Case Studies	25	See Below
Literacy Prin./NGSS Presentation	25	Presentation at Semester End
Final Exam Activity	15	
Total	100	

Letter grades will be based on the percentage of your total points accumulated:

≥93% = **A** 90-92 = **A-** 87-89 = **B+** 83-86= **B** 80-82= **B-** 77-79 = **C+** 73-76 = **C**

PARTICIPATION/CLASS DISCUSSION: You should read the assigned readings to be prepared for online discussions. Participation in discussions is **expected**, will be recorded, and **can affect your grade**. If you have experience with the various processes and hazards we will discuss in class, please share your experiences. Please take the following into consideration when in discussion...

- Pay attention to yourself and others – be considerate of others while they are speaking.
- Presume positive intentions – be considerate of your peers’ opinions to encourage honest and interesting dialogue.

- Pursue a balance between advocacy and inquiry – Influencing the opinions of your peers is fine, just don't push and also keep your mind open to their ideas.

HOMEWORK: Homework will be assigned weekly and will include readings, group homework assignments, reflections, and webquests.

- **Class Reflection:** A self-reflection on your own learning. The reflection provides you with an opportunity to critically evaluate your learning of the material presented in class (a necessary step for a becoming a better teacher) and feedback for us. Due every Sunday by 11:59 PM. Annotated pictures are *highly* recommended.
- **Webquest:** Webquests will be assigned throughout the course and will be due one week after its assigned. A Webquest is a way for you to explore a topic and find useful information to help you understand the topic. Additional information will be provided prior to this assignment.
- **Readings:** Readings will be assigned to prepare you for the weekly discussions and activities and will include journal articles, textbook sections, and online sources
- **Activity/Lesson Assignments:** Out of class activities/lessons will be assigned periodically. Reflection on the activities must be included in the reflection. There will always be multiple activities – you must try at least 2 of them. During the course of the semester, you will also be required to review a lesson assessing the criteria for meeting the Next Generation Science Standards. You will be provided an NSTA rubric to help in your assessment.

CASE STUDIES: Looking at the Oceans from an interdisciplinary systems (atmosphere, lithosphere, hydrosphere, biosphere) approach is conducted by examining each event to sphere and sphere-to-sphere interaction. We will have several Case Studies that will highlight certain topics within the syllabus. You will be expected to participate in those by doing research, discussing ideas with your peers, and then designing a small project/concept map around that topic. The examination of the interactions is accomplished by asking oneself the following questions:

1. How may each of the earth's four spheres (hydrosphere, atmosphere, lithosphere, and biosphere) have caused the event to occur? (The answers to this question are the sphere > event impacts.) Events can occur naturally, such as an earthquake or a hurricane, or they can be caused by humans, such as an oil spill or air pollution. An event can be the **effect** of changes in one or more of Earth's four spheres.
2. What are the effects of the event on each of the earth's four spheres (hydrosphere, atmosphere, lithosphere, and biosphere)? (The answers to this question are the event > sphere impacts.) An event can **cause** changes to occur in one or more of the sphere.
3. What are the effects of changes in one of earth's four spheres (hydrosphere, atmosphere, lithosphere, or biosphere) on each of the other spheres (hydrosphere, atmosphere, lithosphere, or biosphere)? (The answers to this question are the sphere > sphere interactions.) Interactions also occur among the spheres; for example, a change in the atmosphere can cause a change in the hydrosphere, and vice versa.

This approach of answering the questions above is performed during every case study; simply replace the term "event" with the event you wish to investigate. Also, NOTE that many times, the interactions that can occur within the ocean environment often occur as a series of chain reactions. This means one interaction leads to another interaction, which leads to yet another interaction – it is a ripple effect through the earth's spheres.

LITERACY ESSENTIAL PRINCIPLE/NEXT GENERATION SCIENCE STANDARDS PRESENTATION: Each student will choose one of the Ocean Literacy Essential Principles and provide a 10-minute presentation. During the presentation you will be required to show how you plan to use the selected LEP in the classroom FROM AN OCEAN SYSTEM SCIENCE PERSPECTIVE and using the NEW SC science standards (based on the Next Generation Science Standards). You will also be required to lead the class in a lesson that is both innovative in the science concepts presented and teaching methodology. You must provide all copies of lessons to the class and instructor.

ACADEMIC HONESTY POLICY: You are bound by the College of Charleston Honor Code. This means you will produce your own work and will not lie, cheat, plagiarize, steal, or attempt to do so. Collaboration with other students without permission will result in a "0" grade for that particular exam, quiz, or assignment for the first offense. For the second offense, you will receive an 'F' for the entire course. This also applies to cheating or plagiarizing on extra credit papers or assignments. If two papers or assignments are turned in that show such similarity that I interpret it as evidence of cheating or plagiarizing, I will penalize both parties. Should you violate the Honor Code, the College Honor Board will be notified and disciplinary action, up to expulsion, will ensue. For more information see <http://www.cofc.edu/studentaffairs/HonorBoard.htm>.

Cheating includes the use of unauthorized materials, copying from another student's paper, or allowing another student to copy from your paper during exams, quizzes or assignments. Unauthorized materials include quizzes, exams, and assignments from previous semesters. Midterm and final exams are collected and held by the instructor. Students will have the opportunity to review their exams, but will not keep copies of exams. Possession of an exam is considered cheating. Other examples of cheating include unauthorized access to an exam given to the class, if you are taking it at a different time for some valid reason; discussion of any exam with students in another lab section during the semester; copying homework assignments; paying someone to do your assignments or papers; buying or downloading a paper; or leaving the room before completing an exam or quiz without permission.

Plagiarizing includes copying a sentence or sentences verbatim or paraphrasing from the source without using quotations around the verbatim materials and providing a complete reference (author, date, source of material, etc.). This also includes printing or downloading material from the Internet or a database and turning it in as your own work. You **MUST** read, synthesize, and write your own original sentences.

ACCOMMODATIONS: If there is a student in this class who has a documented disability and has been approved to receive accommodations through SNAP Services, please feel free to come and discuss this with me. In not, please know that the College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations should notify me as quickly as possible.

Rubric for Grading Homework

	Exceeds Expectations (3)	Meets Expectations (2)	Below Expectations (1)
Homework is submitted on time			
All steps in homework assignment are addressed in a thoughtful manner			
Demonstrates understanding of science concepts and links to earth system science			
Demonstrates understanding of pedagogy and tools			
Communicates clearly and effectively			
Addresses challenges to homework in a proactive and effective manner			

Guide for Writing Reflections

Reflections serve several purposes:

- A means of communication, conversation (e.g., between material and yourself, yourself and instructors)
- Provides regular feedback between you and the instructors and helps to match expectations
- A platform for synthesis of new knowledge and ideas
- Helps to develop critical thinking
- Helps to elicit topics of interest, challenging topics that need improvement, etc.
- Help to clarify troublesome concepts

When and what to write?

You are expected to write every week and post it to the OAKs website no later than each Sunday of the week at 11:59 PM.

Below are guiding questions that will help you with writing and reflecting upon your learning experiences.

1. Describe three new things you learned this week.
2. List two questions that you still have.
3. Provide an example of how you can incorporate information you learned in the classroom.
4. How can the lessons be improved or altered to meet your needs in the classroom.
5. What are some ways that you could work with teachers in other disciplines to make this a truly interdisciplinary effort?
6. What are common misconceptions people commonly have in these areas?
7. Select one of these misconceptions above. How can we address this misconception in a meaningful way?

Include annotated pictures, which demonstrate your learning.

You will have to address ALL guiding questions, each week, in order to receive full credit (see rubric below). In addressing these questions, record your own thoughts, ideas, responses and reactions to any of the above activities. Make notes about concepts, questions you have, and any confusion that may arise. Use the reflection to explore possible solutions to problems being raised in class or alternative activities to the ones presented in class. Record new insights and problem solving strategies realized during discussions with fellow students and instructors. The reflection reflects your own thoughts and ideas. Be as original and critical (constructively) as you can. You can use whatever writing style you are comfortable with as long as it is clearly written and sensible.

Rubric for Grading Reflections

You will not be graded upon whether your ideas are scientifically or pedagogically correct or not. The table below presents the “essentials” we look for:

	Exceeds Expectations (2-3)	Meets Expectations (1-2)	Less Than Expected (0-1)
Reflection is posted on time			
Reflection is readable and clear			
Reflection reflects upon all guiding questions above			
Reflection is thoughtful and creative			

Rubric for Grading Case Studies

Quality of Understanding: Accuracy of ideas, facts, statements (assertions) about interactions and causal chains				
4: Response is complete and correct.	3: Mostly correct with <u>no</u> major errors, misconceptions or omissions. May contain up to 3 minor inaccuracies.	2: Partially correct with one or two significant omissions, content errors or more than 4 minor errors.	1: Misconceptions about key content in Earth system interactions.	0: Not present
Depth of Reasoning: Clarity and focus of supportable ideas, interactions and systemic relationships				
4: Explains the processes responsible for the causal chains (S>S>S) in the event or context from a scientific perspective with significant depth.	3: Explains the processes responsible for the causal chains (S>S>S) in the event or context from a scientific perspective with some depth.	2: Describes interactions using cause and effect connections including secondary effects that unfold over time, event> sphere>sphere.	1: Describes what is happening in the system, including characteristics and direct effects of the event or context (event>sphere).	0: Not present
Quality Number of Inputs and Outputs				
4: There are 3 inputs and 3 outputs for the scenario	3: There are 2-3 inputs and/or 2-3 outputs for the scenario	2: There are 1-2 inputs and 1-2 outputs for the scenario	1: There is 1 input and 1 output for the scenario	0: Not present
Case Study is communicated clearly				
4: has exemplary overview of the thesis or the writing style is particularly vivid, compelling, or creative.	3: Builds ideas across paragraphs and sections to support the main ideas.	2: Paragraphs support the main ideas/ thesis. Sentence structure sometimes interferes with meaning.	1: The thesis/main ideas about the interactions are clearly stated.	0: Not present

TENTATIVE Schedule

Week	Date	Topic	Homework
1	June 8 IN CLASS	First Day of Class! Introductions Why the Ocean is important and why we should think in a systems approach. Overview of Course, Requirements, Assignments	Webquest 1 Reflection
2	June 9 IN CLASS	Ocean Literacy Principle 1: One Big Ocean Tides and Watersheds	Webquest 2 Lessons (choose 2) Reflection
3	June 10 IN CLASS	Ocean literacy Principle 1: One Big Ocean	Vernier Instruments Reflection
4	June 13 ONLINE	Ocean Literacy Principle 1: One Big Ocean Currents and Waves	Case Study: Great Pacific Garbage Patch Lessons Reflection
5	June 14 ONLINE	Ocean Literacy Principle 2: Shapes Features Plate Tectonics	Webquest 3 Lessons Reflection
6	June 15 ONLINE	Ocean Literacy Principle 3: Weather and Climate	Lessons Reflection
7	June 16 ONLINE	Ocean Literacy Principle 3: Weather and Climate	Case Study: Global Climate Change Lessons Reflection
8	June 17 ONLINE	Ocean Literacy Principle 4: Habitable Photosynthetic Organisms	Lessons Reflection
9	June 20 ONLINE/IN CLASS	Ocean Literacy Principle 4: Habitable CofC Natural History Museum and Aquarium	Lessons Reflection
10	June 21 ONLINE/IN CLASS	Ocean Literacy Principle 5: Diversity of Life Local Habitats (Barrier Islands, Estuaries, Salt Marsh)	Define OLEP for Presentation Lessons Reflection
11	June 22 ONLINE	Ocean Literacy Principle 5: Diversity of Life Life Cycles and Adaptation	Case Study: Coral Reefs Lessons Reflection
12	June 23 ONLINE	Ocean Literacy Principle 6: Interconnected with Humans Pollution and Ocean Acidification	Case Study: Ocean Acidification Lessons Reflection
13	June 24-28 ONLINE	Ocean Literacy Principle 6: Interconnected with Humans Natural Hazards	Webquest 4 (?) Lessons Reflection
14	June 29 ONLINE	Ocean Literacy Principle 7: Unexplored	Work on Presentation Lessons Reflection
Final	June 30/July 1 IN CLASS	Presentations and Final	